METHOD AND APPARATUS FOR PERSISTENT REAL-TIME COLLABORATION

FIELD OF THE INVENTION

[0001] This invention relates generally to the field of collaboration systems and more particularly to a method and apparatus enabling asynchronous and synchronous collaboration between multiple users using persistent objects.

BACKGROUND OF THE INVENTION

[0002] There are many situations in a business environment where it is advantageous for multiple individuals to collaborate on a shared resource. For example, many web conferencing systems allow users to share an application, such as a presentation or white board, with multiple, geographically diverse users simultaneously viewing and modifying the application on a browser at their personal computer. In this manner web-conferencing allows multiple users to exchange and develop ideas synchronously, in real-time. Typically, however, the web-conference state is not persistent, and therefore when the web-conference is terminated, the information related to the conference is deleted, making it difficult for users to easily pick up a discussion thread where it was left off. Some systems provide support for persistent sessions through the use of server-side clients having the specialized purpose of recording the various media used during a conference (audio, video or data). While these systems provide persistence of the conference, they typically do not enable individual users to access the data outside of the web-conferencing forum.

[0003] Other collaborative technologies allow users to share access to resources through the use of content management systems, such as a document repository. Access to content is controlled via an access list, and users on the access list may create, modify or delete documents in the workspace. The accesses to the content are asynchronous, and thus any modification to content are not seen by a user until the user directly accesses the content via the content management system. If it is desired to collaborate synchronously on the content at some time, it is generally copied into a conference system. Because the conferencing system is disconnected from the content management system, the content exists in two different venues, creating a potential for data inconsistencies to be created. In addition, moving from one system to the other introduces breaks in the workflow, thereby impacting overall collaboration efficiency.

[0004] Because collaborative activities typically consist of several phases of asynchronous and synchronous interactions, it is desirable to support seamless transitions between the phases to improve work efficiencies and reduce the potential of data inconsistencies. Some existing collaboration systems attempt to support seamless transitions on the user interface level, but the underlying technology still maintains the two separate and distinct systems of content management and conferencing servers. One problem with the combination of the technologies in this manner is the increased network traffic between the content management system and the server, which reduces the overall efficiency of the collaboration. An additional problem with the combination of the technologies is the continued potential for data inconsistency arising from the interface of multiple servers and content management associated with the collaborators.

[0005] A further problem with both types of collaboration systems is the cumbersome set up required for both systems. For example, web-conference initialization requires authentication of authorized users and establishment of connectivity between the users, content and application. Content management systems require users to create an 'on-line place' before any content can be shared. Thus, the overhead required for establishing such systems makes them undesirable tools for collaborating on a fine grained level.

[0006] It would be desirable to identify a method and apparatus that would enable users to seamlessly transition between synchronous and asynchronous collaborate on any type of content.

SUMMARY OF THE INVENTION

[0007] According to one aspect of the invention, a server includes a storage device for storing an object data structure having a plurality of entries defining attributes of an object, the plurality of attributes apportioned into general entries and variable entries, the general entries including a list of members having access to the object and the variable entries including at least one item of persistent information associated with the object. The storage device also includes broadcast logic for broadcasting changes to the object data structure to the at least one member having access to the object.

[0008] According to another aspect of the invention, a method of sharing at least one item of information between at least two clients coupled to a server is provided. The method includes the step of associating an object with the item of information, the object including a member list indicating clients having access to the item of information, the member list including the at least two clients, a name of the item of information and a value of the information. One of the clients requests modification of the object associated with the item of information. The method includes the steps of selectively modifying the object in response to the request from the one of the clients and reflecting the modification of the other one of the at least two clients.

[0009] According to another aspect of the invention, a client device coupled to a server is provided. The client device includes a storage device for storing an object data structure having a plurality of entries defining attributes of an object, the plurality of attributes apportioned into general entries and variable entries, the general entries including a list of members having access to the object and the variable entries including at least one item of persistent information associated with the object. The client device also includes an application programming interface enabling the client to communicate with a server, including logic for requesting changes to the object data structure associated with the object, and logic for updating the contents of the object data structure in response to communication from the server.

[0010] According to another aspect of the invention, a method is provided for use at a client device coupled to a server. The method maintains a copy of an object associated with an item of information wherein the item of information is accessed by other clients coupled to the server, and the object includes a data structure storing the item of information. The method includes the steps of forwarding a request to a coupled object server, the request for modifying at least one attribute of the object associated with the item of